



# Comparison of Ambient Measurements to Emissions Representations in Modeling

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Presented by:

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Presented to:

The CCOS Technical Committee  
Sacramento, CA  
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## Phase 1 Review –Air Quality Data Task (1 of 4)

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### Site selection based on

- Data availability (distinct counts of VOC, NO<sub>x</sub>, CO, wind measurements)
- Ambient concentration levels (VOC > 50 ppbC; NO<sub>x</sub> > 10 ppb; CO > 0.15 ppm)
- Presence of local emissions sources
- Spatial distribution of sites
- Temporal distribution of the data

### Monitoring site rankings

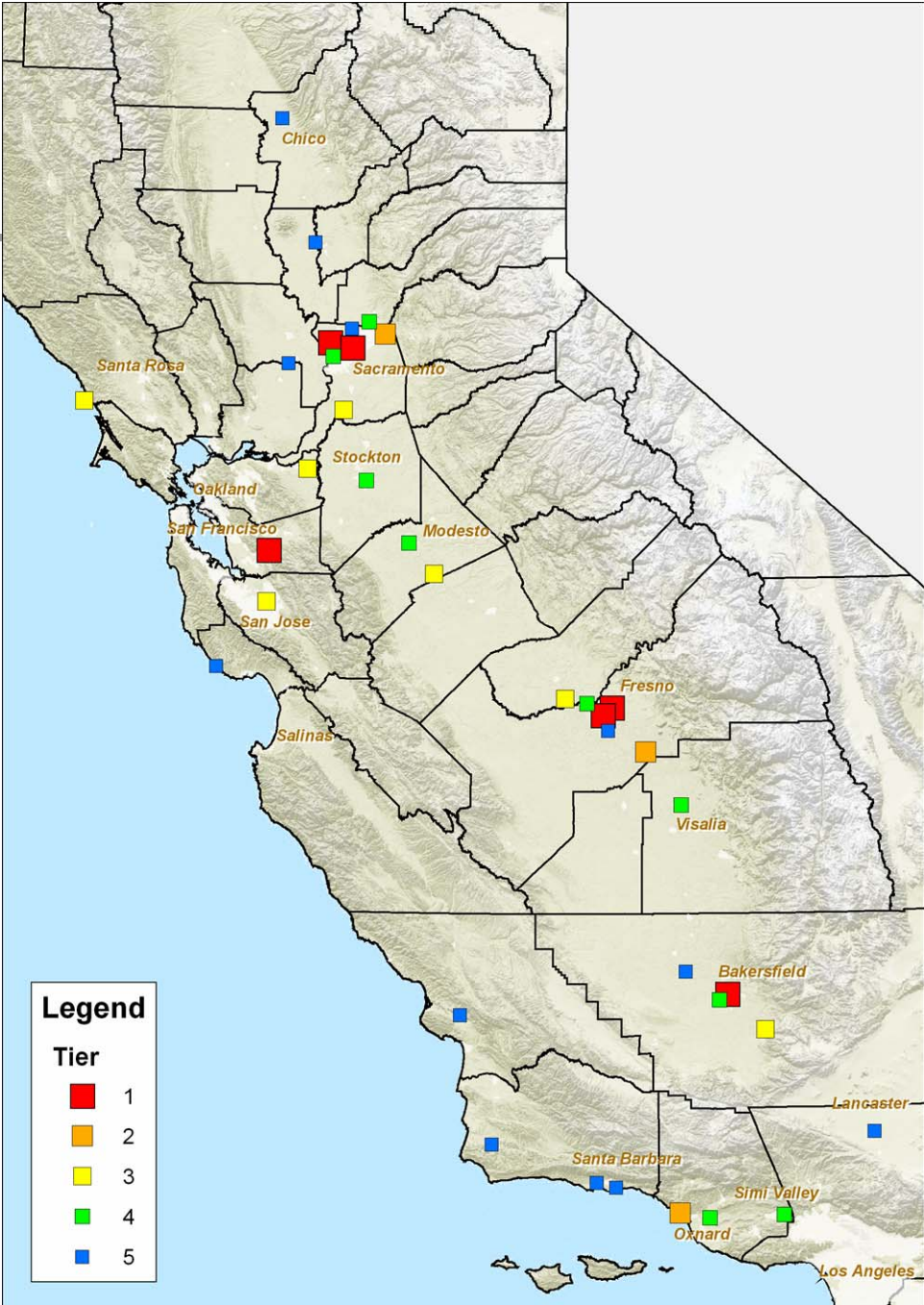
- Tier 1 – VOC, NO<sub>x</sub>, CO, wind data; high local emissions
- Tier 2 – VOC, NO<sub>x</sub>, wind data; some local emissions
- Tier 3 – VOC, NO<sub>x</sub>, wind data; low local emissions
- Tier 4 - NO<sub>x</sub>, CO, wind data; high local emissions
- Tier 5 – Missing one Tier 4 criteria

# Phase 1 Review –Air Quality Data Task (3 of 4)

Site	Air District	Tier	# Speciated VOC > 50 ppbC Samples	# NOx > 10 ppb Samples	# Wind Direction Samples	TOG Emissions (tons/day)	NOx Emissions (tons/day)	Designation	Local or Regional Emissions	# TNMOC > 50 ppbC Samples	# CO > 0.15 ppm Samples
BGS	San Joaquin	1	27	103	752	76	53	Urban	Local	191	24
CLO	San Joaquin	1	21	78	750	199	46	Urban	Local		22
FSF	San Joaquin	1	29	92	746	210	49	Urban	Local	246	20
NAT	Sacramento	1	26	85	756	65	53	Rural	Mixed		24
SDP	Sacramento	1	20	65	756	93	67	Urban	Local		19
SUN	Bay Area	1	30	343	756	94	37	Rural	Regional		527
FLN	Sacramento	2	24	33	569	46	28	Urban	Local		
PLR	San Joaquin	2	25	42	751	63	18	Rural	Regional		
SHA	San Joaquin	2	20	101	752	14	12	Urban	Mixed	239	
ARV	San Joaquin	3	21	37	750	11	9	Rural	Regional	88	
ELK	Sacramento	3	11	50	751	10	20	Rural	Regional		
SJ4	Bay Area	3	6	151		137	85	Urban	Local		32
M29	San Joaquin	3	25	81	748	32	15	Rural	Regional		
BTI	Bay Area	3	35	41	623	15	15	Rural	Regional		8
BODDB	No. Sonoma	3	11	NO <sub>x</sub> only	756	2	1	Rural	Regional	1	NA
TSM	San Joaquin	3	7	89	756	65	25	Urban	Local		18
BAC	San Joaquin	4		86	754	69	49	Urban	Local	49	18
FSS	San Joaquin	4		59	749	171	41	Rural	Mixed		13
M14	San Joaquin	4		79	756	155	29	Urban	Local		21
ROS	Placer	4		68	644	75	45	Urban	Local		15
S13	Sacramento	4		103	755	79	59	Urban	Local		24
SOH	San Joaquin	4		110	687	61	41	Urban	Local		24
VCS	San Joaquin	4		68	753	81	19	Urban	Local		15
CHM	Butte	5		65	756	13	9	Urban	Local		20
DVP	Monterey Bay	5		18	756	37	5	Rural	Regional		6
DVS	Yolo Solano	5		58	739	13	15	Rural	Mixed		6
FSD	San Joaquin	5		93		188	44	Urban	Local		21
GNF	Santa Barbara	5		45	691	34	13	Urban	Local		11
LOM	Santa Barbara	5		35	748	14	4	Urban	Local		14
LWP	Antelope Valley	5		91	755	21	14	Urban	Local		25
SBC	Santa Barbara	5		75	756	32	12	Urban	Local		22
SLM	San Luis Obispo	5		57	756	17	7	Urban	Local		13
SNH	Sacramento	5		58		92	63	Urban	Local		20
YAS	Feather River	5		72	683	17	15	Urban	Mixed		15



# Site map with Tier designations





# Proposed Phase 2 Techniques

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- Review of previous findings
- Analysis methods
  - Ratio comparisons (VOC/NO<sub>x</sub> and individual species)
  - Fingerprint analyses
  - Wildfire analyses
  - Analysis of species that vary temporally
  - Source apportionment (e.g., CMB and PMF) - as a corroborative tool



# Site Specific Issues

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For each selected monitoring site:

- What are the key local emission sources?
- Which of the proposed analyses are supported by the available air quality data? For what time periods?
- What are the strengths and limitations of conducting the proposed analyses?
- What technical questions will be answered by applying the proposed analyses? How will those answers lead to meaningful EI improvements?

# Site Specific Data Summaries (1 of 8)

## Emissions by wind quadrant and dominant source type

Site	Tier	TOG by Wind Quadrant (kg/day)			
		1	2	3	4
BGS (Bakersfield - Golden State)	1	35,570	30,929	34,651	26,391
CLO (Clovis Station)	1	61,926	19,608	156,550	36,526
FSF (Fresno - 1st Street)	1	68,460	115,763	63,331	126,586
NAT (Sacramento - Natoma)	1	3,462	21,419	11,616	52,972
SDP (Sacramento - Del Paso)	1	40,548	36,078	47,140	16,873
SUN (Sunol Station)	1	13,531	12,609	68,541	1,251
FLN (Folsom Station)	2	35,019	8,987	14,265	3,696
PLR (Parlier Station)	2	27,029	12,733	29,719	22,221
SHA (Shafter Station)	3	5,139	3,428	2,314	6,979
ARV (Arvin Station)	3	8,510	885	1,363	2,213
ELK (Elk Grove Station)	3	1,713	2,928	5,276	6,161
SJ4 (San Jose Station - 4th St.)	3	74,249	29,583	39,633	28,104
M29 (Madera Station)	3	22,347	9,251	6,606	13,193
BTI (Bethel Island Station)	3	7,621	2,272	6,940	2,695
BODB (Bodega Bay Station)	3	437	779	151	520
TSM (Turlock Station)	3	40,455	31,685	11,607	24,206
BAC (Bakersfield Station)	4	15,567	56,244	6,933	19,777
GNBY (Granite Bay Station)	4	32,279	8,915	34,541	12,150

Legend:

Area
Mobile (on-road)
Area/Mobile
Non-road
Point



# Site Specific Data Summaries (2 of 8)

## Key source categories\* by site and wind quadrant

Site	Tier	1	2	3	4
BGS (Bakersfield - Golden State)	1	On-road Vehicles Waste Disposal Solvent Use Oil Production Degreasing	On-road Vehicles Waste Disposal Solvent Use Oil Production	On-road Vehicles Waste Disposal Solvent Use	Waste Disposal On-road Vehicles Solvent Use Oil Production
CLO (Clovis Station)	1	On-road Vehicles Solvent Use Waste Disposal	On-road Vehicles Solvent Use Gas Distribution	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles Solvent Use
FSF (Fresno - 1st Street)	1	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles
NAT (Sacramento - Natoma)	1	On-road Vehicles Gas Distribution Oil Production Solvent Use	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use Waste Disposal	On-road Vehicles Gas Distribution Solvent Use Waste Disposal
SDP (Sacramento - Del Paso)	1	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use
SUN (Sunol Station)	1	On-road Vehicles Solvent Use	On-road Vehicles Waste Disposal Solvent Use	Waste Disposal On-road Vehicles	On-road Vehicles Solvent Use
FLN (Folsom Station)	2	On-road Vehicles Gas Distribution Waste Disposal Solvent Use	On-road Vehicles Gas Distribution Waste Disposal Solvent Use	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use
PLR (Parlier Station)	2	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles Solvent Use	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles
SHA (Shafter Station)	3	Pesticide Appl. Waste Disposal On-road Vehicles Solvent Use	On-road Vehicles Pesticide Appl. Solvent Use Aircraft	Pesticide Appl. Waste Disposal On-road Vehicles Solvent Use	Pesticide Appl. On-road Vehicles Oil Production Waste Disposal

\*The source categories listed account for at least 67% of the total TOG emissions in a given wind quadrant.

# Site Specific Data Summaries (3 of 8)

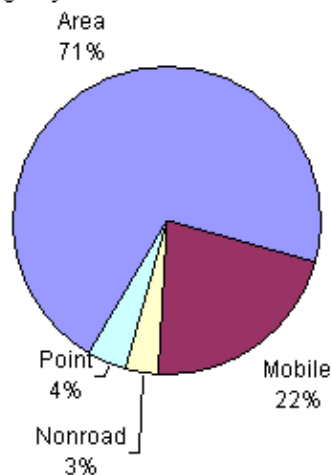
## Key source categories\* by site and wind quadrant (cont'd)

Site	Tier	1	2	3	4
ARV (Arvin Station)	3	Waste Disposal On-road Vehicles Oil Production Pesticide Appl.	Waste Disposal On-road Vehicles Pesticide Appl.	Pesticide Appl. Oil Production Waste Disposal	Fuel Combustion Waste Disposal
ELK (Elk Grove Station)	3	On-road Vehicles Recreational Boats	On-road Vehicles Solvent Use Gas Distribution	On-road Vehicles	On-road Vehicles
SJ4 (San Jose Station - 4th St.)	3	On-road Vehicles Waste Disposal Solvent Use Degreasing	On-road Vehicles Waste Disposal Solvent Use Degreasing	On-road Vehicles Waste Disposal Solvent Use	On-road Vehicles Waste Disposal Solvent Use Degreasing
M29 (Madera Station)	3	On-road Vehicles Wine-making Solvent Use	On-road Vehicles Wine-making Solvent Use	Waste Disposal On-road Vehicles	Waste Disposal On-road Vehicles Solvent Use
BTI (Bethel Island Station)	3	On-road Vehicles Recreational Boats Gas Distribution Solvent Use Fuel Combustion	Recreational Boats	On-road Vehicles Waste Disposal Gas Distribution Solvent Use	Recreational Boats On-road Vehicles Waste Disposal Gas Distribution
BODB (Bodega Bay Station)	3	Recreational Boats	Recreational Boats On-road Vehicles Agricultural Equip.	Recreational Boats	Recreational Boats
TSM (Turlock Station)	3	On-road Vehicles Waste Disposal	On-road Vehicles Waste Disposal	On-road Vehicles Waste Disposal	On-road Vehicles Waste Disposal
BAC (Bakersfield Station)	4	On-road Vehicles Oil Production Waste Disposal	On-road Vehicles Waste Disposal Solvent Use Degreasing	Oil Production On-road Vehicles Pesticide Appl.	On-road Vehicles Waste Disposal Solvent Use
GNBY (Granite Bay Station)	4	On-road Vehicles Gas Distribution Waste Disposal	On-road Vehicles Gas Distribution Waste Disposal	On-road Vehicles Gas Distribution Solvent Use	On-road Vehicles Gas Distribution Solvent Use

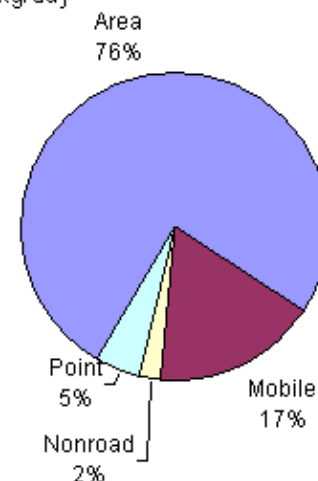
\*The source categories listed account for at least 67% of the total TOG emissions in a given wind quadrant.

# Bakersfield Golden State (BGS)

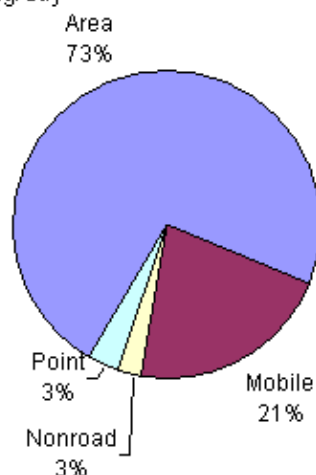
Site: BGS  
Param: TOG  
Ttl: 35570 kg/day  
Quad: 1



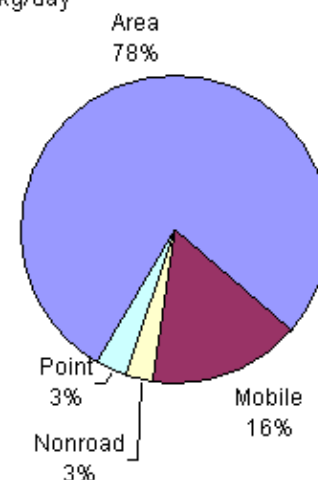
Site: BGS  
Param: TOG  
Ttl: 30929 kg/day  
Quad: 2

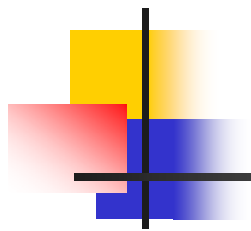


Site: BGS  
Param: TOG  
Ttl: 34651 kg/day  
Quad: 3



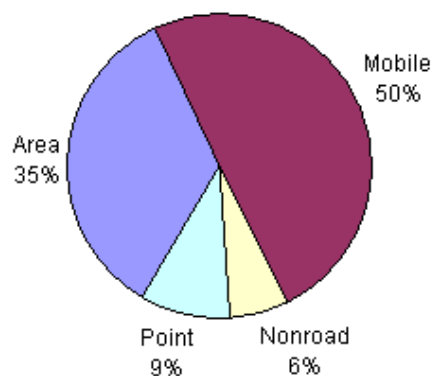
Site: BGS  
Param: TOG  
Ttl: 26391 kg/day  
Quad: 4



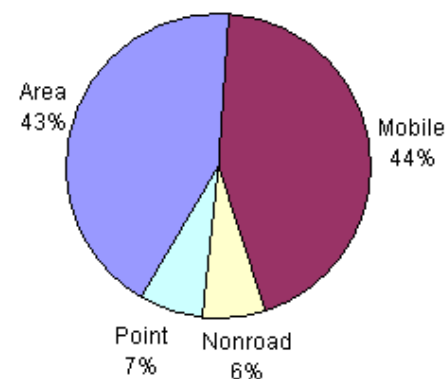


# Sunol Station (SUN)

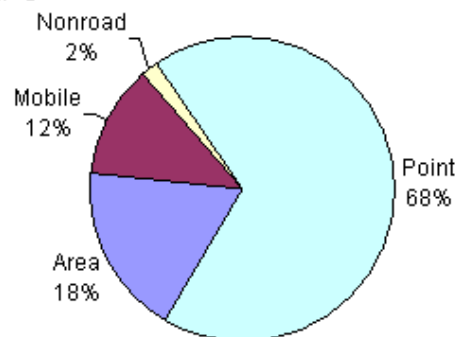
Site: SUN  
Param: TOG  
Ttl: 13531 kg/day  
Quad: 1



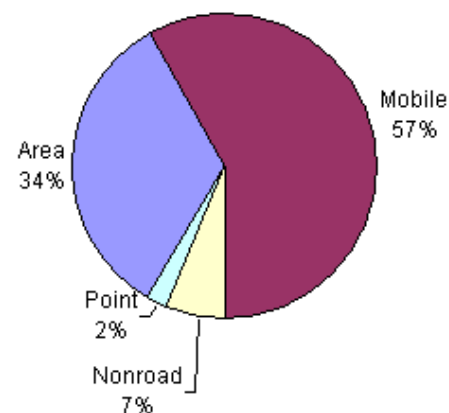
Site: SUN  
Param: TOG  
Ttl: 12609 kg/day  
Quad: 2



Site: SUN  
Param: TOG  
Ttl: 68541 kg/day  
Quad: 3



Site: SUN  
Param: TOG  
Ttl: 1251 kg/day  
Quad: 4



# Site Specific Data Summaries (6 of 8)

July  
TNMOC

Site	Tier	Total Count	Total WD	Total WE	7/1/2000	7/2/2000	7/3/2000	7/4/2000	7/5/2000	7/6/2000	7/7/2000	7/8/2000	7/9/2000	7/10/2000	7/11/2000	7/12/2000	7/13/2000	7/14/2000	7/15/2000	7/16/2000	7/17/2000	7/18/2000	7/19/2000	7/20/2000	7/21/2000	7/22/2000	7/23/2000	7/24/2000	7/25/2000	7/26/2000	7/27/2000	7/28/2000	7/29/2000	7/30/2000	7/31/2000	
FSF	1	173	116	57	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
BGS	1	10	6	4		X			X			X			X			X			X			X			X					X				
NAT	1	9	6	3		X			X						X			X			X			X			X						X			
CLO	1	6	4	2					X			X			X			X			X												X			
SDP	1	2	1	1																											X		X			
FLN	2	9	5	4		X			X			X			X			X						X			X					X		X		
PLR	2	10	6	4		X			X			X			X			X			X			X			X					X		X		
ARV	3	10	6	4		X			X			X			X			X			X			X			X					X		X		
M29	3	6	3	3		X											X				X						X				X		X			
ELK	3	1	1	0					X																											
BODDB	3	1	0	1																						X										
TSM	3	4	3	1																									X	X					X	X

Aug.  
TNMOC

Site	Tier	Total Count	Total WD	Total WE	8/1/2000	8/2/2000	8/3/2000	8/4/2000	8/5/2000	8/6/2000	8/7/2000	8/8/2000	8/9/2000	8/10/2000	8/11/2000	8/12/2000	8/13/2000	8/14/2000	8/15/2000	8/16/2000	8/17/2000	8/18/2000	8/19/2000	8/20/2000	8/21/2000	8/22/2000	8/23/2000	8/24/2000	8/25/2000	8/26/2000	8/27/2000	8/28/2000	8/29/2000	8/30/2000	8/31/2000	
FSF	1	169	131	38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X	X	X	
BGS	1	88	62	26	X			X			X			X			X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	
NAT	1	9	7	2	X			X			X			X			X			X			X			X									X	
CLO	1	9	7	2				X			X			X			X			X			X						X			X			X	
SDP	1	9	7	2	X			X			X			X			X			X			X			X									X	
FLN	2	8	6	2	X			X						X			X			X			X			X									X	
PLR	2	10	9	1	X			X			X			X			X			X						X				X			X		X	
ARV	3	42	30	12										X			X			X			X			X			X	X	X	X	X	X	X	
M29	3	11	9	2	X			X			X			X			X			X			X			X			X			X			X	
ELK	3	3	3	0																X						X									X	
BODDB	3	0	0	0																																
TSM	3	3	3	0	X	X													X																	

# Site Specific Data Summaries (7 of 8)

Site	Tier	Total Count	Total WD	Total WE	9/1/2000	9/2/2000	9/3/2000	9/4/2000	9/5/2000	9/6/2000	9/7/2000	9/8/2000	9/9/2000	9/10/2000	9/11/2000	9/12/2000	9/13/2000	9/14/2000	9/15/2000	9/16/2000	9/17/2000	9/18/2000	9/19/2000	9/20/2000	9/21/2000	9/22/2000	9/23/2000	9/24/2000	9/25/2000	9/26/2000	9/27/2000	9/28/2000	9/29/2000	9/30/2000	
FSF	1	176	122	54	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
BGS	1	182	126	56	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NAT	1	9	6	3			X			X			X			X			X		X	X	X	X											
CLO	1	7	4	3			X			X			X			X					X										X			X	
SDP	1	10	7	3			X			X			X			X			X		X	X	X	X	X										
FLN	2	10	7	3			X			X			X			X			X		X	X	X	X	X										
PLR	2	7	4	3			X									X						X			X				X					X	
ARV	3	144	100	44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
M29	3	9	6	3						X			X			X			X			X			X			X			X			X	
ELK	3	7	5	2						X			X			X			X		X	X	X												
BODB	3	0	0	0																															
TSM	3	0	0	0																															

Sept.  
TNMOC

# Site Specific Data Summaries (8 of 8)

Site	District	SiteName	Tier	TNMOC/NOX ratios	CO/NOX ratios	Species ratios	VOC Fingerprints	Temporal species analysis	PMF
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	A	A	B	B	B	C
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	B	A	B	B		C
FSF	SJV	Fresno Stn (3425 First St.)	1	A	A	C	C	C	
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	B	A	B	B	C	C
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	B	A	B	B	C	C
SUN	Bay Area	Sunol Stn	1			A	A	A	B
FLN	Sacto	Folsom Stn (Natoma St.)	2	B		B	B	C	C
PLR	SJV	Parlier Stn	2	B		A	A	A	B
SHA	SJV	Shafter Stn (Walker St.)	3	A		B	B		C
ARV	SJV	Arvin Stn	3	A		B	B	B	C
ELK	Sacto	Elk Grove Stn (Bruceville Rd.)	3	C		C	C		
SJ4	Bay Area	San Jose Stn (4th St.)	3						
M29	SJV	Madera Stn (29 1/2 No. of Ave 8)	3	A		B	B		
BTI	Bay Area	Bethel Island Stn	3			C	C	B	
BODB	No. Son.	Bodega Bay Stn	3					B	
TSM	SJV	Turlock Stn (900 S Minaret)	3		A		C	B	
BAC	SJV	Bakersfield Stn (5558 California Ave)	4	A	A				
GNBY	Sacto	Granite Bay Stn	4			A	B	A	B

Confidence level  
Counts per wind quadrant

A	B	C
High	Medium	Low
10+	5-10	2-5



# Ratio Comparisons

(1 of 5)

- Convert emission inventory (EI) from mass to moles and compare VOC/NO<sub>x</sub> ratios in EI to ambient data ratios by hour and wind quadrant
- Individual species ratios by hour and wind quadrant (e.g., acetylene/benzene, benzene/toluene, benzene/xylene)

## Key Questions

How do pollutant ratios derived from the EI compare with those from ambient data? How do these ratios vary by site/wind quadrant due to the influence of various emission sources?





# Ratio Comparisons

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(2 of 5)

## Strengths and limitations

- Reproducible/transparent & can be applied to multiple sites with varying emission sources
- Only provides overall relative magnitude of discrepancy

## Meaningful EI improvements

- Can identify specific emission sources or types that are over/underestimated when emissions are dominated by small number of sources or types



# Ratio Comparisons

(3 of 5)

TNMOC/NO<sub>x</sub> recommended for 11 sites:

Site	District	SiteName	Tier	TNMOC/NOX ratios
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	A
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	B
FSF	SJV	Fresno Stn (3425 First St.)	1	A
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	B
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	B
FLN	Sacto	Folsom Stn (Natoma St.)	2	B
PLR	SJV	Parlier Stn	2	B
SHA	SJV	Shafter Stn (Walker St.)	3	A
ARV	SJV	Arvin Stn	3	A
M29	SJV	Madera Stn (29 1/2 No. of Ave 8)	3	A
BAC	SJV	Bakersfield Stn (5558 California Ave)	4	A



# Ratio Comparisons

(4 of 5)

CO/NO<sub>x</sub> recommended for 7 sites:

Site	District	SiteName	Tier	CO/NOX ratios
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	A
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	A
FSF	SJV	Fresno Stn (3425 First St.)	1	A
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	A
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	A
TSM	SJV	Turlock Stn (900 S Minaret)	3	A
BAC	SJV	Bakersfield Stn (5558 California Ave)	4	A



# Ratio Comparisons

(5 of 5)

Individual species ratios recommended for  
11 sites:

Site	District	SiteName	Tier	Species ratios
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	B
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	B
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	B
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	B
SUN	Bay Area	Sunol Stn	1	A
FLN	Sacto	Folsom Stn (Natoma St.)	2	B
PLR	SJV	Parlier Stn	2	A
SHA	SJV	Shafter Stn (Walker St.)	3	B
ARV	SJV	Arvin Stn	3	B
M29	SJV	Madera Stn (29 1/2 No. of Ave 8)	3	B
GNBY	Sacto	Granite Bay Stn	4	A



# Fingerprint Analyses

(1 of 3)

- Comparison of speciated emissions to speciated VOCs in ambient air by hour and wind quadrant

## Key Questions

How does the EI-predicted VOC species composition compare with the ambient data? Do any variations appear to be a result of differences in mass, speciation, or both?



# Fingerprint Analyses

(2 of 3)

## Strengths and limitations

- Reproducible/transparent & can be applied to multiple sites with varying source impacts
- Can provide relative speciation and absolute magnitude discrepancies
- Limited to measured species dominated by a small number of sources or types

## Meaningful EI improvements

- Can identify specific emission sources or types that are over/underestimated and/or mis-specified



# Fingerprint Analyses

(3 of 3)

Recommended for 11 sites:

Site	District	SiteName	Tier	VOC Fingerprints
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	B
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	B
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	B
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	B
SUN	Bay Area	Sunol Stn	1	A
FLN	Sacto	Folsom Stn (Natoma St.)	2	B
PLR	SJV	Parlier Stn	2	A
SHA	SJV	Shafter Stn (Walker St.)	3	B
ARV	SJV	Arvin Stn	3	B
M29	SJV	Madera Stn (29 1/2 No. of Ave 8)	3	B
GNBY	Sacto	Granite Bay Stn	4	B



## Analysis of species that vary temporally (1 of 3)

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- Identify and assess those species such as isoprene that exhibit diurnal patterns (i.e., isoprene, evaporative VOCs)
- Analyze morning and afternoon data for selected abundant species

### Key Questions

Do any discrepancies exist between ambient data and emissions data for those species with strong diurnal patterns? What are the likely sources of those differences?





## Analysis of species that vary temporally (2 of 3)

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### Strengths and limitations

- Reproducible/transparent & can be applied to multiple sites with varying source impacts
- Can provide relative speciation and relative magnitude discrepancies by time-of-day
- Confidence is limited by increased impacts of photochemistry and dispersion during the day

### Meaningful EI improvements

- Can identify temporal profile improvements when individual species or total emissions are dominated by a small number of sources or types



## Analysis of species that vary temporally (3 of 3)

Recommended for 8 sites:

Site	District	SiteName	Tier	Temporal species analysis
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	B
SUN	Bay Area	Sunol Stn	1	A
PLR	SJV	Parlier Stn	2	A
ARV	SJV	Arvin Stn	3	B
BTI	Bay Area	Bethel Island Stn	3	B
BODB	No. Son.	Bodega Bay Stn	3	B
TSM	SJV	Turlock Stn (900 S Minaret)	3	B
GNBY	Sacto	Granite Bay Stn	4	A



# Source Apportionment

(1 of 3)

- Chemical mass balance (CMB) or positive matrix factorization (PMF)
- Use as a tool to corroborate findings from previous analyses

## Key Questions

Does the source mix produced by source apportionment tools match up with the mix calculated from the EI? How does this analysis corroborate the findings of other techniques?



# Source Apportionment

(2 of 3)

## Strengths and limitations

- PMF results are independent of emissions estimates (e.g., based entirely on ambient measurements)
- Independently corroborates other techniques' results
- CMB is very resource intensive and relies on a priori inputs of speciation profiles. (Existing CMB analyses will be reviewed and incorporated into study findings.)

## Meaningful EI improvements

- Strengthen findings of other techniques and further resolve specificity of recommendations (e.g., evaporative vs. exhaust emissions improvements needed)



# Source Apportionment

(3 of 3)

PMF\* recommended for 10 sites:

Site	District	SiteName	Tier	PMF
BGS	SJV	Bakersfield Stn (1128 Golden State)	1	C
CLO	SJV	Clovis Stn (908 N Villa Ave.)	1	C
NAT	Sacto	Sacramento/Natoma Stn (3801 Airport Rd.)	1	C
SDP	Sacto	Sacramento Stn (Del Paso Manor)	1	C
SUN	Bay Area	Sunol Stn	1	B
FLN	Sacto	Folsom Stn (Natoma St.)	2	C
PLR	SJV	Parlier Stn	2	B
SHA	SJV	Shafter Stn (Walker St.)	3	C
ARV	SJV	Arvin Stn	3	C
GNBY	Sacto	Granite Bay Stn	4	B

\*Existing CMB analyses will be reviewed and incorporated into study findings. New CMB analyses may be conducted on a limited basis with support from BAAQMD.



# Phase 2 Decision Point (1 of 3)

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## SJVUAPCD's regionally important organic gas speciation profiles

Profile No.	Profile Name
719	Internal combustion- natural, process gas
757	Natural gas production
3	External combustion - natural gas
549	Fuel combustion - wood
297	Petroleum storage, refining, transport and marketing - crude oil
196	Surface coating - solvent based paint
211	Wine fermentation and aging
1000	Non methyl bromide pesticides

Based on analyses of ROG emissions conducted by the SJVUAPCD.



## Phase 2 Decision Point (2 of 3)

### ARB speciation profiles ranked by MIR-weighted TOG emissions

Profile Name	CCOS	SFBA	SAC	SJV
Gasoline - non-catalyst - stabilized exhaust	1	1	1	1
Gasoline - catalyst -stabilized exhaust	2	2	5	3
Hot soak emissions - California light-duty vehicles	3	4	4	7
Farm equipment - diesel - light & heavy	4	5	3	4
Gasoline - catalyst - FTP bag 1-3	5	3	2	5
Animal waste decomposition	6	12	7	2
Composite jet exhaust JP-5	7	9	12	6
Gasoline - diurnal & resting evaporatives	8	7	10	8
Liquid gasoline - MTBE 11% - commercial grade	9	6	9	11
Gasoline - non-cat - FTP bag 1-3 starts	10	10	8	10
Industrial surface coating - solvent based paint	11	8	6	9
Species unknown - all category composite	12	13	14	14
Medium cure asphalt	13	14	11	13
Architectural coatings - water borne	14	11	13	12

Based on analyses conducted by the Bay Area Air Quality Management District.



# Phase 2 Decision Point (3 of 3)

Analysis	Funded
Review previous findings	✓
Ratio comparisons - VOC/NOx, CO/NOx	✓
Ratio comparisons - individual species	✓
Analysis of species that vary temporally	✓
Source apportionment	✓
Wildfire analysis	✓
Assess sources of uncertainty and bias	✓
Formulate overall findings	✓
Interim and final reports	✓
Further speciation analysis request	<b>\$10k (unfunded)</b>